

“3-D Imaging and Detection of Light Elements with Nuclear Microprobes Using Heavy Ion Beams”

E. Sideras-Haddad, D. Heikkinen, S.H. Connell*, I.Z. Machi*, B. Doyle*, D.H. Morse and J.P.F. Sellschop*.

Lawrence Livermore National Laboratory-CAMS, Livermore, CA.
*Schonland Centre for Nuclear Sciences, University of the
Witwatersrand, Johannesburg 2050, South Africa

The use of heavy-ion microprobes has significant advantages over the commonly used microprobes with proton and alpha beams. Heavy ions due to their higher atomic and mass numbers they induce atomic and nuclear interactions which provide unique features for ion beam analysis. The Elastic Recoil Detection Analysis technique (ERDA) is often applied to the detection of light elements and benefits from larger scattering cross section, better sensitivity and depth resolution when using heavy ions as projectiles. ERDA has been developed to operate in a micro-scanning mode mode using high energy, high charge state heavy ion microbeams. The 2D-map capability in conjunction with the depth information as a third dimension enables the construction of 3D-images of H, Li, Be, B, C, N and O elements. An overview of the methodologies used in various applications will be given.

Work in part done under the auspices of the Department of Energy by Lawrence Livermore National Laboratory under contract W-7405-Eng-48.